

houses were struck and 3 persons stunned by lightning at Knoxville, Tenn.

**12th.**—A heavy rainstorm, with some thunder, occurred at Manchester, N. H., in the early morning; streets and cellars were flooded. The storm was also severe over eastern Massachusetts. At Heath, Mass., one man was killed and another stunned by lightning. During a thunderstorm at Port Royal, S. C., 1.25 inch of rain fell in 30 minutes. A heavy thunder and rain storm occurred at Memphis, Tenn., in the evening; in the eastern suburbs bridges were washed away and street car traffic was suspended for several hours. At Moorhead, Minn., a thunderstorm began 8.30 p. m. and continued until after midnight; rain fell in torrents; the wind shifted from southeast to northeast and reached a velocity of 50 miles per hour; great damage was caused by hail north and east of Moorhead. Lightning killed stock and fired hay stacks north of Fargo, N. Dak. A church was struck by lightning at Sioux City, Iowa.

**13th.**—A wind and hail storm from the northwest unroofed buildings and damaged grain at Elkton, S. Dak. A house was struck by lightning at Buffalo, Kans. A destructive local storm was reported 16 miles northeast of Grapevine, Tex.; buildings were destroyed and cotton and corn damaged.

**14th.**—At Huron, S. Dak., a severe thunderstorm, with small hail, began in the early morning and ended at 8.30 a. m. At 8.30 a. m. the wind backed from southeast to northeast and reached a velocity of 50 miles per hour.

**19th.**—A heavy thunder, wind, and rain storm passed about 20 miles north of Ithaca, N. Y., in the evening, causing considerable damage. In the early afternoon a number of buildings were struck by lightning about Erie, Pa. Three men were killed by lightning at Union City, Ind. Lightning struck in several places at Olney, Ill.

**20th.**—A man was killed by lightning at Springfield, Mo. A number of buildings were wrecked by high wind at Springfield, Kans. Two men were killed and 3 men were badly injured by lightning near Grant, Nebr.

**21st.**—Three persons were shocked by lightning during a severe thunderstorm at Homer, La.

**22d.**—A destructive cloudburst was reported at Roanoke, Va.; one man was drowned; the streets were flooded to a depth of 3 to 5 feet, and the damage to property was estimated at \$100,000. Two persons were reported killed by lightning at Vernon, Tex. An exceptionally heavy rainstorm was reported at Fort Bowie, Ariz.

**23d.**—A heavy thunderstorm visited Augusta, Ga., in the afternoon; two buildings were struck by lightning. Heavy rain flooded streams on the western mountain slopes near Fort Stanton, N. Mex.

**24th.**—One person was killed by lightning near Wilming-

ton, N. C. At Erie, Pa., a thunderstorm continued from 3.10 p. m. until midnight; a house was struck by lightning. A house was struck by lightning at Pensacola, Fla. Near Thornville, Mich., a barn was struck by lightning and burned.

**25th.**—Exceptionally heavy rain fell in New York, except in the southeastern part of the state. At North Hammond, N. Y., 6.40 inches of rain fell in 24 hours. A report from Jamestown, N. Y., states that Chautauqua Lake rose 30 inches in 10 hours.

**26th.**—At Boston, Mass., rain began in the morning and continued until the early morning of the 27th, and the wind reached a velocity of 36 miles per hour.

**28th.**—A house was struck by lightning at Tampa, Fla. A thunderstorm occurred at New Orleans, La. A severe rain and hail storm moved east over the northern part of Morton county, Kans., in a path one mile in width, damaging buildings and leveling corn and grain.

**29th.**—A heavy hail, wind, and rain storm visited Evergreen, Ala. A man was killed by lightning near Abbeville, Ala. An unusually severe rain and thunder storm occurred at Mobile, Ala., in the evening. At Springfield, Ill., a building was struck by lightning in the evening. A man was killed by lightning at Sun Prairie, Wis. At Clarinda, Iowa, a church was struck by lightning and burned. A barn was struck by lightning and burned near Clarinda. At Concordia, Kans., high wind demolished frail buildings, and damage was caused by heavy rain in the early morning.

**30th.**—A man was killed by lightning at Columbia, Ala. High wind, reaching a velocity of 30 miles per hour at 8.45 p. m., and heavy seas prevailed at Grand Haven, Mich. A number of vessels were compelled to run into that port for shelter. In the evening a schooner was capsized 14 miles north of Manistee; the crew, consisting of 8 persons, were drowned, and the vessel was a total loss. At Detroit, Mich., the wind reached a maximum velocity of 33 miles per hour at 7.12 p. m.; a large steamer was lost 60 miles west of Whitefish Point, and passengers and crew, numbering 28 persons, were, with one exception, drowned. Disasters were reported at other points on the upper lakes.

**31st.**—A heavy rain and thunder storm prevailed at New Brunswick, N. J., from 12.15 to 1.10 p. m. At Wilmington, N. C., a thunderstorm began 12.13 p. m. and ended 2.30 p. m.; .40 inch of rain fell in 5 minutes, .68 inch in 10 minutes, and 1.10 inch in 20 minutes. After a short interval the storm recommenced and continued until after midnight; 2 houses were struck by lightning. At Pensacola, Fla., a house was struck by lightning. At San Antonio, Tex., a heavy rain and thunder storm began 6.20 and ended 9.05 a. m., during which time 3.20 inches of rain fell, and the temperature fell 22°; streams rose rapidly, causing considerable damage.

## ATMOSPHERIC ELECTRICITY.

### THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 35, on the 9th and 10th; in 32 on the 4th and 11th; in 20 to 30 on the 1st, 2d, 5th to 8th, 12th, 19th to 27th, and 29th; in 10 to 19 on the 3d, 13th, 14th, 16th, 17th, 18th, 28th, 30th, and 31st; and in 9 on the 15th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 31, in Florida; on 20 to 30 in Alabama, Georgia, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, Nebraska, North Carolina, North Dakota, South Carolina, South Dakota, Tennessee, and Texas; on 10 to 19 in Arkansas, Connecticut, Illinois, Indiana, Mary-

land, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin. The only states or territories for which thunderstorms were reported on less than 10 dates were, the District of Columbia on 3, and Indian Territory on 4 dates.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 1st, 2d, 4th to 9th, 13th to 23d, 25th, 27th, 29th, 30th, and 31st; in California on the 3d, 4th, 30th, and 31st; in Colorado on the 2d to 12th, 16th to 28th, and 31st; in Idaho on the 2d, 19th, and 24th; in Nevada on the 1st to 8th, 10th, 11th, 16th, 17th, 19th to 24th, 30th, and 31st; in New Mexico on the 3d to 24th, 26th, 27th, and 28th; in Utah on the 4th to 11th, and 17th to 24th; in Washington on the 3d, 4th, 10th, and 24th; and in Wyoming on the 4th, 6th, 8th, 9th, 19th, 21st, 22d, and 24th.

### AUROBAS.

#### Auroral displays of August, 1892.

Date.	Station.	Extent of display.		Remarks.
		Azimuth.	Altitude.	
6	Sault Ste. Marie, Mich..	180 to 270	25	Arch of green color resting on dark segment.
8	Havre, Mont.....	Cov'd 180	Zenith	An arch, with beams.
12	Philadelphia, Pa .....	In north.	25	A diffused white light, with beams, which had a lateral movement toward the west.
12-13	Sault Ste. Marie, Mich..	180 to 270	85	Green color.
12	Bismarck, N. Dak.....	135 to 250	30	Arch, with streamers.
12-13	Rapid City, S. Dak .....		30	Pale beams moved from east to west.

### Auroral displays of July, 1892—Continued.

Date.	Station.	Extent of display.		Remarks.
		Azimuth.	Altitude.	
12	Lander, Wyo .....			Two white beams tinged with green, and yellow beams along horizon.
17	Sault Ste. Marie, Mich..	135 to 225	20	Green color.
19	Sault Ste. Marie, Mich..	180 to 270	20	Green color.
23	Northfield, Vt.....	190 to 235	15	Pale green color.
23	Fort Buford, N. Dak.....	190 to 235	15	Diffused white light, with streamers.
24	Duluth, Minn.....	Cov'd 90	Zenith	Beams of bright light.
28	Alpena, Mich .....	135 to 190	35	Streamers of white light.

## INLAND NAVIGATION.

### STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, August, 1892 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La .....	29.9	6.0	1	1.0	25	5.0
<i>Arkansas River.</i>						
Fort Smith, Ark .....	22.0	5.2	31	1.5	26	3.7
Little Rock, Ark .....	23.0	8.5	1, 31	7.0	13	1.5
<i>Missouri River.</i>						
Fort Buford, N. Dak .....	11.0		1	6.6	28	4.4
Bismarck, N. Dak .....		6.4	1	2.5	31	3.9
Pierre, S. Dak .....	14.0	3.7	1	1.7	31	2.0
Sioux City, Iowa .....	18.7	10.8	1	6.3	28-30	4.5
Omaha, Nebr .....	18.0	11.0	1	7.8	30, 31	3.2
Kansas City, Mo .....	21.0	13.5	1	8.1	31	5.4
<i>Mississippi River.</i>						
Saint Paul, Minn .....	14.0	6.4	1	3.3	29	3.1
La Crosse, Wis .....	11.8	6.9	3	2.8	29	4.1
Dubuque, Iowa .....	16.0	7.9	7-9	4.2	31	3.7
Davenport, Iowa .....	15.0	5.6	10-13	3.2	31	2.4
Keokuk, Iowa .....	14.0	6.4	1	3.7	26	2.7

### Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Mississippi River—Continued.</i>						
Hannibal, Mo .....	17.0	7.8	1, 2	4.8	27, 28	3.0
Saint Louis, Mo .....	30.0	18.8	1	9.5	29-31	9.3
Cairo, Ill .....	40.0	20.7	1	10.3	31	10.4
Memphis, Tenn .....	33.0	17.6	1	7.8	31	9.8
Vicksburg, Miss .....	41.0	36.6	1	11.6	31	25.0
New Orleans, La .....	13.0	13.5	1	4.7	29-31	8.8
<i>Ohio River.</i>						
Parkersburg, W. Va. ....	38.0	7.0	1, 2	2.7	12	4.3
Cincinnati, Ohio .....	45.0	10.8	7	5.5	30, 31	5.3
Louisville, Ky .....	24.0	5.8	9	3.6	31	2.2
<i>Cumberland River.</i>						
Nashville, Tenn .....	40.0	3.5	1	1.7	22	1.8
<i>Tennessee River.</i>						
Chattanooga, Tenn .....	33.0	4.9	6	2.7	25	2.2
<i>Monongahela River.</i>						
Pittsburg, Pa .....	29.0	6.7	29	5.0	13	1.7
<i>Savannah River.</i>						
Augusta, Ga .....	32.0	11.9	26	6.7	23	5.2
<i>Willamette River.</i>						
Portland, Oregon .....	15.0	8.0	1	2.5	31	5.5
<i>Susquehanna River.</i>						
Harrisburg, Pa .....	17.0	4.2	16	1.8	3, 24	2.4
<i>Alabama River.</i>						
Montgomery, Ala .....	48.0	18.5	20	2.4	6, 7	16.1

## STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for August, 1892, of the directors of the various state weather services:

### ALABAMA.

**Temperature.**—The mean was 0.2 below the normal; maximum, 100, at Brewton, 12th; minimum, 56, at Valley Head, 4th and 14th; greatest monthly range, 38, at Jasper; least monthly range, 16, at Cheplatepec.

**Precipitation.**—The average was 2.03 above the normal; greatest monthly, 13.55, at Brewton; least monthly, 2.19, at Carrollton.

**Wind.**—Prevailing direction, east.—*P. H. Mell, Observer, Weather Bureau, Auburn, director.*

### ARIZONA.

**Temperature.**—Maximum, 123, at Fort Mohave, 5th; minimum, 46, at Fort Apache, 30th, and at Holbrook, 30th and 31st; greatest monthly range, 60, at Fort Mohave; least monthly range, 28, at Farleys Camp.

**Precipitation.**—Greatest monthly, 3.40, at Walnut Ranch; least monthly, 0.00, at Fort Mohave, Phoenix, and Rancho del Pueblo.

**Wind.**—Prevailing direction, southwest.—*J. C. Hayden, Observer, Weather Bureau, Tucson, director.*

### ARKANSAS.

**Temperature.**—The mean was 0.2 above the normal; maximum, 106, at Keesees Ferry, 6th; minimum, 47, at Fayetteville, 31st; greatest monthly range, 54, at Keesees Ferry; least monthly range, 24, at Greenville, Miss.

**Precipitation.**—The average was 1.58 above the normal; greatest monthly, 8.54, at Dallas; least monthly, 0.78, at Harrison.

**Wind.**—Prevailing direction, south.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Local Forecast Official, Weather Bureau, assistant.*

### CALIFORNIA.

**Temperature.**—The mean was 0.2 below the normal; maximum, 117, at

Needles, 4th and 17th; minimum, 38, at Nordhoff, 11th; greatest monthly range, 72, at Nordhoff; least monthly range, 14, at Ventura.

**Precipitation.**—The average was 0.06 below the normal; greatest monthly, 0.11, at Julian; least monthly, 0.00, at a number of stations.

**Wind.**—Prevailing direction, west.—*J. A. Barwick, Observer, Weather Bureau, Sacramento, director.*

### COLORADO.

**Temperature.**—The mean was 2.0 above the normal; maximum, 108, at Lamar, 4th; minimum, 21, at Breckenridge, 30th; greatest monthly range, 76, at Steamboat Spring; least monthly range, 43, at Cumbres.

**Precipitation.**—The average was 1.00 below the normal; greatest monthly, 5.29, at Avoca; least monthly, 0.00, at Rico, Saint Cloud, and Steamboat Spring.

**Wind.**—Prevailing direction, west.—*W. S. Miller, Observer, Weather Bureau, Denver, director.*

### FLORIDA.

**Temperature.**—Maximum, 101, at Micco, 12th; minimum, 67, at Plant City, 8th; greatest monthly range, 33, at Micco; least monthly range, 15, at Clermont.

**Precipitation.**—Greatest monthly, 13.74, at Oxford; least monthly, 1.59, at Key West.

**Wind.**—Prevailing direction, southeast.—*E. R. Demain, Observer, Weather Bureau, Jacksonville, director.*

### GEORGIA.

**Temperature.**—Maximum, 100, at Cordele, 1st; minimum, 58, at Lafayette, 14th; greatest monthly range, 39, at Adairsville; least monthly range, 18, at Hepzibah.